REMARKS

Claims 1 to 10, 16 to 26 and 32 are pending in this application. Claims 11 to 15 and 27 to 31 have been withdrawn.

Claims 1 to 4, 9 to 10, 17 to 20 and 25 to 26 stand rejected under 35 U.S.C. § 103 as being unpatentable over the combination of U.S. Patent No. 6,356,272 to Matsumoto et al., U.S. Patent No. 6,424,746 to Nishida and U.S. Patent Application Publication No. 2001/0005424 to Watanabe et al. Applicants thank the Examiner for allowing claims 5 to 8, 16, 21 to 24 and 32.

The rejections under 35 U.S.C. § 103 should be withdrawn.

In order to reject a claim for obviousness under 35 U.S.C. § 103, the prior art must teach or suggest each and every element of the claim and must also suggest combining the elements in the manner contemplated in the claim. *See Northern Telecom, Inc. v. Datapoint Corp.*, 908 F.2d 931, 934 (Fed. Cir. 1990), *cert. denied* 111 S. Ct. 296 (1990); *In re Bond*, 910 F.2d 831, 834 (Fed. Cir. 1990). Applicants respectfully submit that these criteria are not met here.

Claims 1 to 4, 9 to 10, 17 to 20 and 25 to 26 are allowable.

Claims 1 to 4, 9 to 10, 17 to 20 and 25 to 26 stand rejected under 35 U.S.C. § 103 as unpatentable in view of the combination of Matsumoto, Nishida and Watanabe. Applicants respectfully disagree with the Examiner's rejection for at least the reason that the combination of Matsumoto, Nishida and Watanabe[1] does not disclose the limitation from claims 1 to 3, 10, 17 to 19 and 26 of:

> refining the initial three-dimensional model of the object by selecting the silhouette contour polygons for a given image, projecting each face of the initial three-dimensional model of the object onto the two-dimensional plane of image collection for the given image and revising the set of vertices of the projected face so that it bounds the space which falls within the boundaries of the silhouette contour polygons for the given image

or the limitation from claims 4, 9, 20 and 25 of:

> refining the initial three-dimensional model of the object by projecting each

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1 Because the combination of Matsumoto, Nishida and Watanabe does not disclose all of the limitations of the claims at issue here, it is not necessary to address whether the combination of Matsumoto, Nishida and Watanabe is proper. Applicants do not admit that it is a proper combination.

face of the initial three-dimensional model of the object onto a two-dimensional plane which also contains a projection of one of the two-dimensional silhouette contour polygons and revising the set of vertices of the projected face so that it bounds the space which falls within the boundaries of the projected silhouette contour polygon.

As the examiner admits (e.g. on page 7 of the Office Action), Matsumoto does not describe refining the initial three-dimensional model by projecting each face of the model onto a two-dimensional plane and revising the set of vertices of the projected face so that it bounds the space which falls within the boundaries of a projected silhouette contour polygon. In contrast, Matsumoto describes refining a three-dimensional model through the use of a voxel model which "describes a three-dimensional shape according to the absence/presence of a three-dimensional lattice point" (Col. 18:38-41). Matsumoto describes using conical projection of silhouette images onto an initial voxel model to "vote" on the voxels to be retained in the model (Col. 18:10-30, Fig. 9).

Applicants respectfully disagree with the Examiner that Matsumoto's volumetric approach to refining the model is the same as the two-dimensional projection approach recited in the claims at issue here. While the end result of both approaches may be a more refined model, this "functional equivalence" is not the standard by which patentability is judged, but rather the prior art must teach or suggest each and every element of the claim. As noted in the present application (see page 6), the use of a volumetric approach like that in Matsumoto can cause difficulties in processing and inaccuracies in the final object model because, for example, a volumetric approach starts with a fixed-sized grid. Matsumoto describes the voxel grid it uses as a cylindrical coordinate system of volumeric elements with the cylindrical coordinates that are "divided at equal intervals" (Col. 17:40-55). The use of such a grid limits the resolution and thus accuracy of the final model to the resolution of the grid. In contrast, the invention recited in claims 1 to 4, 9 to 10, 17 to 20 and 25 to 26 uses vertices which are not required to have coordinates at fixed intervals system but are revised to bound the space which falls within the projected silhouette contours. Thus, Matsumoto does not describe this limitation of claims 1 to 4, 9 to 10, 17 to 20 and 25 to 26.

Applicants also respectfully disagree with the Examiner's position that Watanabe describes refining an initial three-dimensional model by projecting each face of the model onto a two-dimensional plane and revising the set of vertices of the projected face so that it

bounds the space which falls within the boundaries of a projected silhouette contour polygon. The section of Watanabe referenced by the examiner describes using perspective projection of a three-dimensional model onto images which have "corresponding" points previously designated by a user (paragraphs 52, 58-64; see also the corresponding points shown in Fig. 5). Watanabe describes using these corresponding points to formulate equations which may be solved to determine parameters of the three-dimensional model.

Applicants respectfully disagree with the Examiner's position that paragraph 53 describes revising the set of vertices of the projected face so that it bounds the space which falls within the boundaries of a projected silhouette contour polygon. Paragraph 53 describes the user, "by dragging a mouse or the like," establishing the correspondence between a *wire frame* of the three dimensional model and the image and making clear "where the three-dimensional model is positioned on each frame." As expressed more clearly in paragraph 42, "in the image–three-dimensional model correspondence obtaining part 208, the user also specifies portions corresponding to each other between each image and the three-dimensional model." As noted above, these corresponding points are then used to formulate equations which may be solved to determine parameters of the three-dimensional model. Applicants respectfully submit that paragraph 53 does not describe the limitation of claims 1 to 3, 10, 17 to 19 and 26 of "revising the set of vertices of the *projected face* so that it bounds the space which falls within the boundaries of the silhouette contour polygons for the given image" or the similar language in claims 4, 9, 20 and 25.

Watanabe does not describe revising the perspective projected model so that its vertices fall within a projected silhouette contour, as recited in the claims at issue here. Thus, Watanabe also does not describe this limitation of claims 1 to 4, 9 to 10, 17 to 20 and 25 to 26 and the Examiner has not alleged that Nishida describes this limitation of claims 1 to 4, 9 to 10, 17 to 20 and 25 to 26.

Thus, for at least these reasons, claims 1 to 4, 9 to 10, 17 to 20 and 25 to 26 are allowable and the rejections should be withdrawn.

Conclusion

Applicants respectfully submit that all pending claims are in condition for allowance. Prompt consideration and allowance of the present application are therefore earnestly solicited.

A Notice of Allowance is respectfully requested.

The Office is hereby authorized to charge any additional fees or credit any overpayments under 37 C.F.R. §§ 1.16 or 1.17 to Deposit Account No. 11-0600.

The Examiner is invited to contact the undersigned at (212) 425-7200 to discuss the application.

Respectfully submitted,

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By: _____

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